

CLAIMS

I claim:

1. A system for cleaning components of a water retaining device, the system comprising:
 - a first pump for controlling a flow of a cleaning agent from a source of the cleaning agent;
 - a second pump for controlling a flow of water from a water source;
 - a tank, coupled to the first pump and the second pump, for receiving the water and the cleaning agent from the first pump and the second pump to produce a diluted solution, and selectively dispensing the diluted solution;
 - at least one supply valve, coupled between the tank and the components of the water retaining device, for controlling a flow of the diluted solution to the components of the water retaining device; and
 - control circuitry that controls operation of at least the first pump and the second pump in accordance with a procedure for cleaning the components of the water retaining device.
2. The system of claim 1, further comprising a motor arranged to drive the first pump and the second pump.
3. The system of claim 1, wherein the first pump and the second pump are configured to provide the tank a predetermined ratio of the cleaning agent to the water to produce the diluted solution.

4. The system of claim 1, wherein the control circuitry includes a pressure switch that detects a pressure in the tank, stops the flow of the water and the cleaning agent to the tank when the pressure in the tank reaches a first threshold, and activates the flow of the water and the cleaning agent to the tank when the pressure in the tank reaches a second threshold, the second threshold being substantially less than the first threshold.
5. The system of claim 1, wherein the at least one supply valve comprises a first supply valve coupled between the tank and air system components of the water retaining device and a second supply valve coupled between the tank and water system components of the water retaining device.
6. The system of claim 1, wherein the at least one supply valve comprises one of an electrically controlled valve, a hydraulically controlled valve, a mechanically controlled valve and a pneumatically controlled valve.
7. The system of claim 1, further comprising at least one outflow device, coupled to at least one suction output of the water retaining device, for controlling a flow of the diluted solution out of air and water system components of the water retaining device in accordance with the procedure for cleaning the components of the water retaining device.

8. The system of claim 7, wherein the at least one outflow device comprises one of an electrically controlled valve, a hydraulically controlled valve, a mechanically controlled valve and a pneumatically controlled valve.

9. The system of claim 7, wherein the at least one outflow device comprises a diaphragm.

10. The system of claim 7, further comprising:

a tee fitting, coupled between the at least one supply valve and the water system components of the water retaining device, to divide the diluted cleaning solution among at least some of the water system components; and

a tube coupled to the tee fitting to supply fluid pressure to the at least one outflow device;

wherein the at least one outflow device comprises:

a valve seat;

a plug normally separated from the valve seat;

a shaft coupled at a first end to the plug;

a valve body defining a first chamber and a second chamber;

a spring positioned within the second chamber and about a portion of the shaft, the spring being coupled at a first end to a wall of the second chamber; and

a diaphragm separating the first chamber from the second chamber and being coupled to a second end of the shaft and to a second end of the spring,

wherein fluid pressure supplied from the tube causes the diaphragm to compress

the spring and urge the shaft toward the valve seat such that the plug engages the valve seat and closes the outflow device, and wherein removal of fluid pressure from the tube allows the spring to extend and urge the diaphragm toward the tube such that the shaft disengages the plug from the valve seat to open the outflow device.

11. The system of claim 7, wherein the at least one outflow device controls the flow of diluted solution out of the components of the water retaining device at a rate that is slower than a rate at which the at least one supply valve controls the flow of diluted solution to the components of the water retaining device.

12. The system of claim 1, wherein the first pump comprises an automotive fuel pump.

13. The system of claim 12, further comprising an automotive fuel injector positioned between the first pump and the tank.

14. The system of claim 1, wherein the control circuitry further controls the at least one supply valve in accordance with the procedure for cleaning the components of the water retaining device.

15. The system of claim 1, wherein the control circuitry includes a control panel arranged to inform a user of the system that the water retaining device requires cleaning.

16. A system for cleaning components of a water retaining device, the system comprising:

a pump for controlling a flow of cleaning solution from a source of the cleaning solution;

a tank, coupled to the pump, for receiving, storing, and selectively dispensing the cleaning solution;

at least one supply valve, coupled between the tank and the components of the water retaining device, for controlling a flow of the cleaning solution to the components of the water retaining device; and

control circuitry that controls operation of at least the pump and the at least one supply valve in accordance with a procedure for cleaning the components of the water retaining device.

17. The system of claim 16, wherein the control circuitry includes a pressure switch that detects a pressure in the tank, stops the flow of the cleaning solution to the tank when the pressure in the tank reaches a first threshold, and activates the flow of the cleaning solution to the tank when the pressure in the tank reaches a second threshold, the second threshold being substantially less than the first threshold.

18. The system of claim 16, wherein the at least one supply valve comprises a first supply valve coupled between the tank and air system components of the water retaining

device and a second supply valve coupled between the tank and water system components of the water retaining device.

19. The system of claim 16, further comprising at least one outflow device, coupled to at least one suction output of the water retaining device, for controlling a flow of the cleaning solution out of the components of the water retaining device in accordance with the procedure for cleaning the components of the water retaining device.

20. The system of claim 19, wherein the at least one outflow device comprises a diaphragm.

21. The system of claim 19, wherein the at least one outflow device controls the flow of cleaning solution out of the components of the water retaining device at a rate that is slower than a rate at which the at least one supply valve controls the flow of cleaning solution to the components of the water retaining device.

22. A system for cleaning components of a plurality of water retaining devices, the system comprising:

a first pump for controlling a flow of a cleaning agent from a source of the cleaning agent;

a second pump for controlling a flow of water from a water source;

a tank, coupled to the first pump and the second pump, for receiving the water and the cleaning agent from the first pump and the second pump to produce a diluted solution, and selectively dispensing the diluted solution;

a plurality of supply valves coupled between the tank and the components of the plurality of water retaining devices for controlling a flow of the diluted solution to the components of the plurality of water retaining devices; and

control circuitry that controls the operation of at least the first pump and the second pump in accordance with a procedure for cleaning the components of the plurality of water retaining devices.

23. The system of claim 22, further comprising a plurality of outflow devices coupled to suction outputs of the plurality of water retaining devices for controlling a flow of the diluted solution out of the components of the plurality of water retaining devices in accordance with the procedure for cleaning the components of the plurality of water retaining devices.

24. The system of claim 22, further comprising a manifold, coupled between the tank and the plurality of supply valves, for controlling the flow of the diluted solution to the plurality of supply valves.

25. The system of claim 22, wherein the control circuitry controls the flow of diluted solution to the plurality of supply valves such that the plurality of water retaining devices are cleaned one at a time.

26. A system for cleaning components of a hydro-massage tub, the system comprising:

- a storage device for storing a cleaning agent in concentrated liquid form;

- a first pump, coupled to the storage device, for controlling a flow of the cleaning agent from the storage device;

- a second pump for controlling a flow of water from a water source;

- a tank, coupled to the first pump and the second pump, for receiving the water and the cleaning agent from the first pump and the second pump to produce a diluted solution, storing the diluted solution, and selectively dispensing the diluted solution;

- a first supply valve, coupled between the tank and water system components of the tub, for controlling a flow of the diluted solution to the water system components of the tub;

- a second supply valve, coupled between the tank and air system components of the tub, for controlling a flow of the diluted solution to the air system components of the tub;

a diaphragm valve, coupled between the water system components of the tub and a suction output of the tub, for controlling a flow of the diluted solution out of at least the water system components of the tub; and

control circuitry that controls the operation of the first pump, the second pump, the first supply valve, and the second supply valve in accordance with a procedure for cleaning the components of the tub.

27. The system of claim 26, wherein the diaphragm valve controls the flow of diluted solution out of at least the water system components of the tub at a rate that is slower than a rate at which the first supply valve and the second supply valve control the flow of the diluted solution to the water and air system components of the tub.

28. A water retaining device that includes components requiring occasional cleaning, the water retaining device comprising:

at least one supply valve that controls a flow of cleaning solution from a remote source of the cleaning solution to the components of the water retaining device; and

at least one outflow valve, coupled to a suction output of the water retaining device, for controlling a flow of the cleaning solution out of the components of the water retaining device;

wherein the at least one outflow valve controls the flow of cleaning solution out of the components of the water retaining device at a rate that is slower than a rate at which the at least one supply valve controls the flow of cleaning solution to the components of the water retaining device.

29. The water retaining device of claim 28, wherein the components of the water retaining device include water system components, the water retaining device further comprising:

a tee fitting, coupled between the at least one supply valve and the water system components, to divide the cleaning solution among at least some of the water system components; and

a tube coupled to the tee fitting to supply fluid pressure to the at least one outflow valve;

wherein the outflow valve comprises:

a valve seat;

a plug normally separated from the valve seat;

a shaft coupled at a first end to the plug;

a valve body defining a first chamber and a second chamber;

a spring positioned within the second chamber and about a portion of the shaft, the spring being coupled at a first end to a wall of the second chamber; and

a diaphragm separating the first chamber from the second chamber and being coupled to a second end of the shaft and to a second end of the spring,

wherein fluid pressure supplied from the tube causes the diaphragm to compress the spring and urge the shaft toward the valve seat such that the plug engages the valve seat and closes the outflow valve, and wherein removal of fluid pressure from the tube allows the spring to extend and urge the diaphragm toward the tube

such that the shaft disengages the plug from the valve seat to open the outflow valve.

30. A method for cleaning components of a water retaining device, the method comprising:

supplying cleaning solution to a storage device located remotely from the water retaining device;

controllably dispensing the cleaning solution from the storage device to the components of the water retaining device; and

controllably prohibiting the cleaning solution from exiting the components of the water retaining device until substantially all the components of the water retaining device have been wetted by the cleaning solution.

31. The method of claim 30, further comprising:

rinsing the cleaning solution from the water retaining device.